



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,454	04/30/2001	Bharath Rangarajan	F0662	3018

7590 10/10/2003

Himanshu S. Amin
Amin & Turocy, LLP
National City Center
1900 E. 9th Street, 24th Floor
Cleveland, OH 44114

EXAMINER

TRAN, BINH X

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 10/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/845,454

Applicant(s)

RANGARAJAN ET AL.

Examiner

Binh X Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 13-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 25 is/are rejected.
- 7) ☒ Claim(s) 10-12 is/are objected to.
- 8) ☒ Claim(s) 1-25 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eriguchi et al. (US 6,113,733) in view of Su (US 6,486,492).

Eriguchi discloses a system for monitoring and regulating etch process comprising:

at least one etching component (i.e. gas inlet 609 or heater 604) operative to etch at least one portion of a wafer (103) (Fig 18);

an etch component driving system (608, control flow meter; or heater) for driving the at least one etching component;

Art Unit: 1765

a system (611, Xe lamp) for directing light (618) toward one or more gratings located on at least one portion of the wafer (Fig 18, Fig 30);

an etch monitor system (613) operate to measure one or more etching parameters from the light reflected from the one or more gratings (Fig 18, col. 37 lines 45-55);

a computer (615) (read on "processor") operatively coupled to the etch monitoring system (613) and the etch component driving system (608), wherein the computer receives an etching parameter data from the measuring system (613) and analyzes the etching parameter (Fig 18).

Eriguchi also discloses that the computer analyzes the etching parameter by comparing the etching parameter data to stored etching data (i.e. initial value) to generate a control data to control with the etching component (Fig 1). Eriguchi fails to disclose that the control is a feed-forward control data. In a system for monitoring etching process, Su discloses that the control is a feed-forward control data to control the etching component (abstract). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Eriguchi in view of Su by using a feed-forward control data because it will improve critical dimension during the etching process.

4. Claims 2-6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eriguchi and Su as applied to claim 1 above, and further in view of Xu et al. (US 6,483,580).

Art Unit: 1765

Respect to claim 2, Eriguchi and Su fail to disclose the use of scatterometry system. However, Eriguchi clearly discloses the use of ellipsometric system for processing the light reflected from the one or more grating (col. 9 lines 25-50). In a semiconductor method, Xu discloses the use of scatterometry system to obtain an ellipsometric signature. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Eriguchi and Su in view of Xu by using the scatterometry system because equivalent and substitution of one for the would produce an expected result.

Respect to claim 3, Eriguchi discloses that the computer coupled to the spectroscope, the computer analyzes data received from the spectroscope and produces an analyzed date (Fig 11, 18, col. 37). Eriguchi further discloses the computer control the etching component (i.e. gas inlet or temperature) via the etching component driving system (heater or flow rate control meter). The limitation regarding scatterometry system has been discussed above.

Respect to claim 4, Eriguchi discloses the etch process is the main etching (Fig 1). Respect to claim 5, Eriguchi discloses the etch process is an anisotropic etch process (Fig 2a-2c). Respect to claims 6 and 8, Eriguchi discloses the mechanism of the etch process is a chemical basis such as plasma etching technique (abstract).

5. Claims 7, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eriguchi, Su and Xu further in view of Ko et al. (US 6,117,791).

Respect to claims 7, 9, Eriguchi discloses the dry etching process is a plasma etching process or a sputtering etching (col. 33 lines 57-61). However, Eriguchi fails to

Art Unit: 1765

disclose specifically that the dry etching is one of reactive ion etching or glow discharge sputtering. Ko discloses that the dry etching including RIE and glow discharge sputtering (col. 2 lines 8-22). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Eriguchi, Su, and Xu in view of Ko by using either RIE or glow discharge sputtering because these techniques are capable of accurately reproducing the features of a protective mask.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jahns (US 5,711,843) in view of Su and further in view of Xu.

Jahns discloses a system for monitoring the etching process comprising:

a spectrometer with a detector array for sensing the acceptability of etching in at least one of the grid blocks of the wafer (Fig 7);

means for controlling (controller 707) the etching of a wafer portion (Fig 7);

means for selectively controlling (computer 706) the means for etching (Fig 7, col. 11 lines 30-61)

Jahns discloses a spectrometer with a detector for sensing the acceptability of the etching. However, Jahns fails to specify that the spectrometer is scatterometry. Xu discloses a spectroscopic scatterometer. It would have been obvious to one having ordinary skill in the art, at the time of invention to modify Jahns in view of Xu by using a scatterometry means because equivalent and substitution of one for the other would produce an expected result.

Jahns also fails to disclose means for partitioning a wafer into one or more grid block. Su disclose a means for partitioning a wafer into one or more grid block (col. 5

Art Unit: 1765

lines 6-18, Fig 1). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Jahns and Xu in view of Su by including a means for portioning a wafer into one or more grid because allow multiple patterns on the wafer.

Allowable Subject Matter

7. Claims 10-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments filed 8-18-2003 have been fully considered but they are not persuasive. The applicants argues that "neither Eriguchi et al. nor Su teaches or suggest *directing a single light onto one or more grating... and thereafter ... measuring one or more etching parameter from light reflected from one or more grating*".

According to applicants, Eriguchi teaches a system for detecting defects using two light beams. This argument is not commensurate with the scope of the claims because the applicants use the transitional term "comprising" in the preamble. According to the MPEP 2111.03, the transitional term "comprising" is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. "Comprising" is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim. "Comprising" leaves "the claim open for the inclusion of unspecified ingredients even in major amounts". The examiner clearly recognizes that Eriguchi discloses two light beams in his invention. However, since the applicants use the transitional term

Art Unit: 1765

"comprising", which allows additional or unrecited elements, the examiner still maintains Eriguchi discloses the system with two light beams read on applicants' system with one light beam.

Respect to claim 25, the applicants argue that the cited reference do not teach or suggest "*partitioning a wafer into....grid blocks and sensing the acceptability of etching in ... grid blocks via scatterometry*". The examiner disagrees with the arguments. Jahns teaches to detect the process fingerprint and to monitor the process environments such as temperature, gas flow rate, and pressure certainly read on the limitation of "sensing the acceptability of etching". The applicants further argue "the system of Jahns cannot determine portions of a wafer that are defective. Rather, an entire wafer would be deemed defective even in an instance that only a small portion of such wafer was actually defective and could be repaired". This argument is not commensurate with the scope of the claim. In claim 25, the applicants claims "partitioning a wafer into one or more grid blocks; ... mean for sensing the acceptability of etching in at least one of the one or more grid blocks...controlling the etching of a wafer portion" (emphasis added). Since the applicants claim that the wafer can be partitioned into one grid block, the examiner reserves the right to interpret the entire wafer is equivalent to one grid block.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Art Unit: 1765

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (703) 308-1867. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (703) 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Binh X. Tran

NADINE G. NORTON
PRIMARY EXAMINER

